**Title: Linking Real-World Data to the Classroom**

**Link to Outcomes:**

- **Problem Solving** Students will apply the process of analyzing data to present real-world problem situations.
- **Communication** Students will express generalizations discovered through investigations and will express these orally and in writing.
- **Reasoning** Students will gather evidence and make conjectures.
- **Connections** Students will gather data in one format and represent it in another.
- **Algebra** Students will analyze tables and graphs to explore the interrelationships of these representations.
- **Statistics** Students will transform data to aid in data interpretation and prediction.
- **Technology** Students will have access to Internet, TI graphics calculators, and TI-Graph Link to aid in data retrieval and analysis.
- **Cooperation** Students will demonstrate their ability to investigate mathematics by working cooperatively in small groups.

**Brief Overview:**

In order to make intelligent decisions from the vast amounts of available information, students need to have experience in collecting and analyzing data. In this lesson students will research a collection of data and construct a graphical representation of that data. Students will analyze the relationships that exist and make inferences.

**Grade/Level:**

Grades 8 - 12: Algebra/Statistics

**Duration:**

The lesson is expected to take two to three days depending on information access and extensions.

**Prerequisite Knowledge:**

Students must be familiar with graphical representation. For the extension, students must understand how to calculate statistical measures and how to find regressions.

**Objectives:**

- Students will explore sources of data, i.e., Statistical Abstracts, World Almanac, Internet.
- Students will make a graphical representation of the retrieved data, i.e., histogram, pie chart, bar or line graph, scatter plot.
- Students will write a descriptive analysis of the data.
- Students will write possible explanations for generalizations that relate to the data.
- Students will make a prediction for the future, where applicable.

**Materials/Resources/Printed Materials:**

- Library Resources (Statistical Abstracts, World Almanac, Newsbank, etc.)
- Internet
- TI Graphing Calculators and TI-Graph Link
- Computer Software: *Data Insights*

**Development/Procedures:**

Teacher will arrange students in small groups. Each group must collect data of some interest (subject to teacher approval) from available sources. Once the students collect the data, they will construct an appropriate graphical representation. Students will then begin to analyze the data trends, lack of trends, highs, lows, etc. A discussion should follow with inferences and convincing arguments. The groups should also reach a consensus on a future prediction, where possible. This discussion and consensus should be submitted in a written report. The students will make a presentation to the class.

**Evaluation:**

Group evaluation will be based upon the graphical representation, written report, and class presentation.

**Extension/Follow Up:**

- The mean, median, mode, and/or standard deviation could be determined.
- Students could construct a scatter plot on a graphing calculator and determine regression.
- Information could be shared with another class in another school through the Internet.

**Authors:**

Jacqueline M. Singleton
Tallwood High School
Virginia Beach, Virginia

Cheryl L. Bonat
Woodbridge High School
Prince William County

**The following is one example to demonstrate this lesson:**

**Activity 1: Data Retrieval Using the Internet**

- Perform a net search on *Netscape* of "sales of personal computers."
- Choose "Computer Almanac - Numbers about Computers."
- Choose "Uses in Home and at Work."
  (Another path: Education under the Net Directory then to Databases.)

**Data retrieved:**

Percent of U.S. Homes with Personal Computers from Marvin Sirbu, CMU

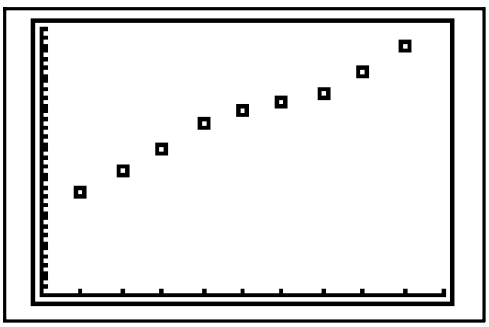
1985: 13.6%
1986: 16.6%
1987: 19.4%
1988: 22.4%
1989: 24.0%
1990: 25.4%
1991: 26.6%
1992: 29.6%
1993: 32.7%

Additional information of interest:

| | |
|---|---|
| Percent of households with televisions | 98% |
| Percent of households with VCR's | 80% |
| 12 million game consoles sold in 1993 | |

**Activity 2: Construction of Graphical Representation**

Using the TI-82, enter data. With appropriate window settings, graph scatter plot. Using the TI-Graph Link, print a copy of the scatter plot.



**Percent of U.S. Homes with Personal Computers**

**Activity 3: Analysis of the Data and Future Prediction**

- The percent of U.S. homes with personal computers has been on a steady climb during the years 1985 to 1993.

- The following table gives the percent of change:

| YEAR | PERCENT | % CHANGE |
|---|---|---|
| **1985** | 13.6 | |
| **1986** | 16.6 | +3.0 |
| **1987** | 19.4 | +2.8 |
| **1988** | 22.4 | +3.0 |
| **1989** | 24.0 | +2.0 |
| **1990** | 25.4 | +1.4 |
| **1991** | 26.6 | +1.2 |
| **1992** | 29.6 | +3.0 |
| **1993** | 32.7 | +3.1 |

- We believe that the sales of personal computers will continue to increase. Business, industry, education, and government have so integrated the use of computers in their operations that many people use computers in school or on the job. More people are becoming familiar with computers, and computer software is now more affordable and user friendly.

- We predict that in the future computers in the home will be as common as the television is today. We believe that the technology will be so networked within communities that computers will be a necessary tool.

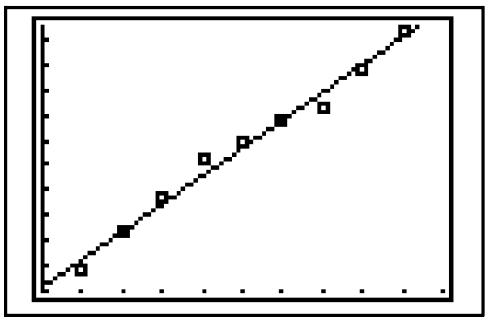
**Extension Activity: Using Linear Regression to Make Predictions**

Note: This activity is not limited to linear regression, quadratic, or power regressions, it may be used in higher levels of algebra.

Observing the scatter plot, we believe that the data would best be represented by a linear regression. Prior to using the TI-82 graphics calculator, students should have the opportunity to discuss domain and range, as well as, to investigate finding an equation of best fit. Then, using the TI-82 graphics calculator, we calculate the linear regression variables.

Lin Reg
$y = ax + b$
$a = 2.213333333$
$b = 12.3$
$r = 0.9918183824$

Recognizing that the correlation coefficient (r) is so close to 1, our group agrees that this is definitely a linear regression. We then transferred these figures into [Y =] to obtain the following graph:



**Percent of Personal Computers in U.S. Homes**

We predict that in 1999, by using the formula $y = 2.21x + 12.3$, there will be 45.5% U.S. homes with personal computers.